AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A computer-implemented method of discovering relationships between items, comprising:

accepting, in a computer, item selections detected from a plurality of users;

generating, in the computer, a log for each user, each log containing identifiers corresponding to detected user item selections;

accepting, in the computer, a query including at least one query item identifier;

scoring, in the computer, each of the user logs, the scoring for each user log being responsive to a degree of occurrence of the at least one query item identifier in the user log[[s]], so as to generate a user log score[[s]] for each user log based exclusively on detected user item selections and the at least one query item;

determining, in the computer, at least one result item, responsive to a degree of occurrence in at least a subset of the scored user logs, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item.

2. (Original) The computer-implemented method of claim 1, wherein a significance of the occurrence is determined by a log likelihood ratio analysis and the determined result is responsive to the determined significance.

3. (Original) The computer-implemented method of claim 1, wherein a significance of the occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and the determined result is responsive to the determined significance.

4. (Original) The computer-implemented method of claim 1, wherein each item is a video track and wherein accepting item selections comprises determining which tracks are selected for playback.

5. (Original) The computer-implemented method of claim 1, wherein each item is a music track and wherein accepting item selections comprises determining which tracks are selected for playback.

6. (Previously Presented) The computer-implemented method of claim 5, further comprising:

generating, in the computer, a track list containing an identifier for each determined result item comprising a music track.

7. (Previously Presented) The computer-implemented method of claim 6, further comprising:

deleting, in the computer, from the track list at least one identifier corresponding to a music track already selected by the user.

8. (Original) The computer-implemented method of claim 6, further comprising:
playing the music tracks specified by the generated track list.

9. (Previously Presented) The computer-implemented method of claim 5, further comprising:

accepting, in the computer, a format schedule specifying music track categories for time periods; and

generating, in the computer, a track list conforming to the format schedule and containing an identifier for each determined result item comprising a music track.

10. (Original) The computer-implemented method of claim 5, wherein scoring the user logs comprises determining a degree of occurrence in each user log of at least one music track identified by the query item identifier.

11. (Original) The computer-implemented method of claim 5, wherein scoring the user logs comprises determining a degree of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier.

12. (Original) The computer-implemented method of claim 1, wherein accepting item selections comprises receiving input provided by a user via a web page.

13. (Original) The computer-implemented method of claim 1, wherein accepting item selections comprises receiving input specifying an item purchase by a user.

14. (Previously Presented) The computer-implemented method of claim 1, further comprising, prior to determining the at least one result item, defining, in the computer, the subset of the scored user logs responsive to the user log scores.

15. (Previously Presented) The computer-implemented method of claim 1, further comprising:

monitoring, in the computer, user behavior with respect to the selected items; and

adjusting, in the computer, the user log responsive to the monitored user behavior.

16. (Original) The computer-implemented method of claim 15, wherein monitoring user behavior comprises at least one selected from the group consisting of:

detecting user input requesting that a selected item be repeated;

detecting user input requesting that a selected item be skipped;

detecting user input specifying a volume change; and

detecting user input specifying that a selected item be muted.

17. (Original) The computer-implemented method of claim 1, wherein accepting item selections comprises receiving input provided by a user via an application for playing tracks.

18. (Original) The computer-implemented method of claim 1, wherein accepting a query comprises receiving a user log containing identifiers for a user's item selections.

19. (Previously Presented) The computer-implemented method of claim 1, wherein accepting a query comprises receiving a first search term, the method further comprising:

generating, in the computer, a second search term containing an identifier for each determined result item.

20. (Previously Presented) The computer-implemented method of claim 19, further comprising at least one of:

providing, in the computer, the second search term as input for a search engine; and

adding, in the computer, the second search term to a searchable portion of a document associated with the first search term.

21. (Original) The computer-implemented method of claim 1, further comprising:

periodically uploading the generated log.

22. (Original) The computer-implemented method of claim 1, further comprising:

outputting an advertisement relating to the determined at least one result item.

23. (Original) The computer-implemented method of claim 22, wherein outputting an advertisement comprises displaying at least one selected from the group consisting of:

a web page;

a banner;

a portion of a web page; and

an animation.

24. (Original) The computer-implemented method of claim 1, further comprising:

outputting a notification relating to the determined at least one result item.

25. (Original) The computer-implemented method of claim 24, wherein outputting a notification comprises displaying a web page.

26. (Original) The computer-implemented method of claim 24, wherein outputting a notification comprises sending a communication to a user.

27. (Original) The computer-implemented method of claim 26, wherein sending a communication to a user comprises at least one selected from the group consisting of:

transmitting an electronic mail message to the user;

telephoning the user; and

sending a direct mail item to the user.

28. (Previously Presented) The computer-implemented method of claim 1, wherein the determined result is responsive to a significance of the occurrence of the item in at least a subset of the scored user logs, and wherein the significance is determined by a log likelihood ratio analysis submethod comprising:

determining, in the computer, a total number of user logs N;

determining, in the computer, a number of user logs N_1 in a subset of user logs;

determining, in the computer, a number of user logs N_2 not in the subset of user logs;

determining, in the computer, a number of user logs k_{11} in the subset that include the item;

determining, in the computer, a number of user logs k_{12} not in the subset that include the item;

determining, in the computer, a number of user logs $k_{21} = N_1 - k_{11}$ in the subset that do not include the item;

determining, in the computer, a number of user logs $k_{22} = N_2 - k_{12}$ not in the subset that do not include the item;

and determining, in the computer, a log likelihood ratio for the item.

29. (Original) The computer-implemented method of claim 28, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

30. (Previously Presented) The computer-implemented method of claim 29, further comprising:

adjusting, in the computer, at least one of the k_{ij} values responsive to at least one selected from the group consisting of:

the number of occurrences of the item in a user log;

the logarithm of the number of occurrences of the item in a user log;

the number of occurrences of the item in all user logs;

the logarithm of the total number of users divided by the number of users who have selected the item; and

a normalizing factor.

31. (Original) The computer-implemented method of claim 30, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

32. (Previously Presented) The computer-implemented method of claim 1, further comprising:

deleting, in the computer, from the determined at least one result item any result items already selected by a user associated with the query.

33. (Previously Presented) The computer-implemented method of claim 1, further comprising:

ranking, in the computer, the at least one result item responsive to the degree of significance.

34. (Previously Presented) A computer-implemented method of discovering a relationship between a first item and a second item, comprising:

determining, in the computer, a total number of item groups N;

determining, in the computer, a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item;

determining, in the computer, a number of item groups N_2 not in the subset of item groups;

determining, in the computer, a number of item groups k_{11} in the subset that contain the first item;

determining, in the computer, a number of item groups k_{12} not in the subset that contain the first item;

determining, in the computer, a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item;

determining, in the computer, a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item;

determining, in the computer, a log likelihood ratio; and

generating, based on the log likelihood ratio, a representation of the relationship between the first item and the second.

35. (Original) The computer-implemented method of claim 34, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

36. (Original) The computer-implemented method of claim 35, wherein each item group comprises a document.

37. (Previously Presented) The computer-implemented method of claim 35, further comprising:

adjusting, in the computer, at least one of the k_{ij} values responsive to at least one selected from the group consisting of:

the number of occurrences of the item in a document;

the logarithm of the number of occurrences of the item in a document;

the number of occurrences of the item in all documents;

the logarithm of the total number of documents divided by the number of documents that include the item; and

a normalizing factor.

38. (Original) The computer-implemented method of claim 37, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j represents the number of occurrences of the item in all documents and W_{ij} represents the number of occurrences of the item in a particular document.

39. (Currently Amended) A system for discovering relationships among items, comprising:

a user interface for accepting item selections from a plurality of users;

at least one log database, coupled to the user interface, for storing a log for each user, each log containing identifiers corresponding to detected user item selections;

a query input device for accepting a query including at least one query item identifier; and

a relationship discovery engine, coupled to the log database and to the query input device, for scoring each of the user logs, the scoring for each user log being responsive to a degree of occurrence of the at least one query item identifier in the user log[[s]], so as to generate a user log score[[s]] for each user log based exclusively on detected user item selections and the at least one query item, and for determining at least one result item, responsive to a degree of occurrence in at least a subset of the scored user logs, so as to discover a relationship based exclusively on detected user item selections and the at least one query item.

40. (Original) The system of claim 39, wherein the significance of the occurrence is determined by a log likelihood ratio analysis and the recommendation engine determines the at least one result item responsive to the determined significance.

41. (Original) The system of claim 39, wherein the significance of the occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and wherein the recommendation engine determines the at least one result item responsive to the determined significance.

42. (Original) The system of claim 39, wherein each item is a video track and wherein the user interface accepts item selections by determining which tracks are selected for playback.

43. (Original) The system of claim 39, wherein the user interface accepts item selections by determining which tracks are selected for purchase.

44. (Original) The system of claim 39, wherein each item is a music track and wherein the user interface accepts item selections by determining which tracks are selected for playback.

45. (Original) The system of claim 44, wherein the user interface comprises an online jukebox.

46. (Original) The system of claim 45, wherein the online jukebox monitors user behavior with respect to the selected items and adjusts the user log scores responsive to the monitored user behavior.

47. (Original) The system of claim 46, wherein the online jukebox monitors user behavior by detecting at least one selected from the group consisting of:

user input requesting that a selected item be repeated; and
user input requesting that a selected item be skipped; and
user input specifying a volume change; and
user input specifying that a selected item be muted.

48. (Original) The system of claim 47, further comprising:

a track list generator, coupled to the recommendation engine, for generating a track list containing an identifier for each determined result item comprising a music track.

49. (Original) The system of claim 44, further comprising:

a music player, coupled to the track list generator, for playing the music tracks specified by the generated track list.

50. (Original) The system of claim 44, further comprising:

a format scheduler, for accepting a format schedule specifying music track categories for time periods; and

a track list generator, coupled to the recommendation engine and to the format scheduler, for generating a track list conforming to the format schedule and containing an identifier for each determined result item comprising a music track.

51. (Original) The system of claim 39, wherein the query input device receives a user log containing identifiers for a user's item selections.

52. (Original) The system of claim 39, wherein the query input device receives a first search term, the system further comprising:

a search term generator, coupled to the recommendation engine, for generating a second search term containing an identifier for each determined result item and for providing the second search term as input for a search engine.

53. (Original) The system of claim 39, wherein the query input device receives a first search term, the system further comprising:

a search term generator, coupled to the recommendation engine, for generating a second search term containing an identifier for each determined result item and for providing the second search term to be added to a searchable portion of a document associated with the first search term.

54. (Original) The system of claim 39, further comprising:

an advertisement output device, coupled to the recommendation engine, for outputting an advertisement relating to the determined at least one result item.

55. (Original) The system of claim 54, wherein the advertisement output device displays at least one selected from the group consisting of:

a web page;

a banner;

a portion of a web page; and

an animation.

56. (Original) The system of claim 39, further comprising:

a notification output, coupled to the recommendation engine, for outputting a notification relating to the determined at least one result item.

57. (Original) The system of claim 56, wherein the notification output device displays at least one selected from the group consisting of:

a web page;

a banner;

a portion of a web page; and

an animation.

58. (Original) The system of claim 56, wherein the notification output device sends a communication to a user.

59. (Currently Amended) A computer-readable medium comprising computer-readable code for discovering relationships between items, comprising:

computer-readable code adapted to accept item selections detected from a plurality of users;

computer-readable code adapted to generate a log for each user, each log containing identifiers corresponding to detected user item selections;

computer-readable code adapted to accept a query including at least one query item identifier;

computer-readable code adapted to score each of the user logs, the scoring for each user log being responsive to a degree of occurrence of the at least one query item identifier in the user log[[s]], so as to generate a user log score[[s]] for each user log based exclusively on detected user item selections and the at least one query item;

computer-readable code adapted to determine at least one result item, responsive to a degree of occurrence in at least a subset of the scored user logs, so as to discover a relationship based exclusively on detected user item selections and the at least one query item.

60. (Original) The computer-readable medium of claim 59, wherein a significance of the occurrence is determined by a log likelihood ratio analysis and the determined result is responsive to the determined significance.

61. (Original) The computer-readable medium of claim 59, wherein a significance of the occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and the determined result is responsive to the determined significance.

62. (Original) The computer-readable medium of claim 59, wherein each item is a video track and wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to determine which tracks are selected for playback.

63. (Original) The computer-readable medium of claim 59, wherein each item is a music track and wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to determine which tracks are selected for playback.

64. (Original) The computer-readable medium of claim 63, further comprising:

computer-readable code adapted to generate a track list containing an identifier for each determined result item comprising a music track.

65. (Original) The computer-readable medium of claim 64, further comprising:
computer-readable code adapted to delete from the track list at least one identifier corresponding to a music track already selected by the user.

66. (Original) The computer-readable medium of claim 64, further comprising:
computer-readable code adapted to play the music tracks specified by the generated track list.

67. (Original) The computer-readable medium of claim 63, further comprising:
computer-readable code adapted to accept a format schedule specifying music track categories for time periods; and
computer-readable code adapted to generate a track list conforming to the format schedule and containing an identifier for each determined result item comprising a music track.

68. (Original) The computer-readable medium of claim 63, wherein the computer-readable code adapted to score the user logs comprises computer-readable code adapted to determine a degree of occurrence in each user log of at least one music track identified by the query item identifier.

69. (Original) The computer-readable medium of claim 63, wherein the computer-readable code adapted to score the user logs comprises computer-readable code adapted to determine a degree of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier.

70. (Original) The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to receive input provided by a user via a web page.

71. (Original) The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to receive input specifying an item purchase by a user.

72. (Original) The computer-readable medium of claim 59, further comprising, computer-readable code adapted to, prior to determine the at least one result item, define the subset of the scored user logs responsive to the user log scores.

73. (Original) The computer-readable medium of claim 59, further comprising:

computer-readable code adapted to monitor user behavior with respect to the selected items; and

computer-readable code adapted to adjust the user log scores responsive to the monitored user behavior.

74. (Original) The computer-readable medium of claim 73, wherein the computer-readable code adapted to monitor user behavior comprises at least one selected from the group consisting of:

computer-readable code adapted to detect user input requesting that a selected item be repeated;

computer-readable code adapted to detect user input requesting that a selected item be skipped;

computer-readable code adapted to detect user input specifying a volume change; and

computer-readable code adapted to detect user input specifying that a selected item be muted.

75. (Original) The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to receive input provided by a user via an application for playing tracks.

76. (Original) The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept a query comprises computer-readable code adapted to receive a user log containing identifiers for a user's item selections.

77. (Original) The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept a query comprises computer-readable code adapted to receive a first search term, the computer-readable medium further comprising:

computer-readable code adapted to generate a second search term containing an identifier for each determined result item.

78. (Original) The computer-readable medium of claim 77, further comprising at least one of:

computer-readable code adapted to provide the second search term as input for a search engine; and

computer-readable code adapted to add the second search term to a searchable portion of a document associated with the first search term.

79. (Original) The computer-readable medium of claim 59, further comprising:

computer-readable code adapted to periodically upload the generated log.

80. (Original) The computer-readable medium of claim 59, further comprising:

computer-readable code adapted to output an advertisement relating to the determined at least one result item.

81. (Original) The computer-readable medium of claim 80, wherein the computer-readable code adapted to output an advertisement comprises computer-readable code adapted to display at least one selected from the group consisting of:

a web page;

a banner;

a portion of a web page; and

an animation.

82. (Original) The computer-readable medium of claim 59, further comprising:
computer-readable code adapted to output a notification relating to the determined at least one result item.

83. (Original) The computer-readable medium of claim 82, wherein the computer-readable code adapted to output a notification comprises computer-readable code adapted to display a web page.

84. (Original) The computer-readable medium of claim 82, wherein the computer-readable code adapted to output a notification comprises computer-readable code adapted to send a communication to a user.

85. (Original) The computer-readable medium of claim 84, wherein the computer-readable code adapted to send a communication to a user comprises at least one selected from the group consisting of:
computer-readable code adapted to transmit an electronic mail message to the user;
computer-readable code adapted to telephone the user; and
computer-readable code adapted to send a direct mail item to the user.

86. (Previously Presented) The computer-readable medium of claim 59, wherein the determined result is responsive to a significance of the occurrence of the item in at least a subset of the scored user logs, and wherein the computer-readable code adapted to determine a determined at least one result item comprises computer-readable code adapted to determine the result by a log likelihood ratio analysis submethod.

87. (Original) The computer-readable medium of claim 86, wherein the computer-readable code adapted to determine the result by a log likelihood ratio analysis submethod comprises:

computer-readable code adapted to determine a total number of users N;

computer-readable code adapted to determine a number of users N_1 in a subset of users;

computer-readable code adapted to determine a number of users N_2 not in the subset of users;

computer-readable code adapted to determine a number of users k_{11} in the subset that selected the item;

computer-readable code adapted to determine a number of users k_{12} not in the subset that selected the item;

computer-readable code adapted to determine a number of users $k_{21} = N_1 - k_{11}$ in the subset that did not select the item;

computer-readable code adapted to determine a number of users $k_{22} = N_2 - k_{12}$ not in the subset that did not select the item; and

computer-readable code adapted to determine a log likelihood ratio for the item.

88. (Original) The computer-readable medium of claim 87, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

89. (Previously Presented) The computer-readable medium of claim 86, wherein the computer-readable code adapted to determine the result by a log likelihood ratio analysis submethod further comprises:

computer-readable code adapted to adjust at least one of the n_{ij} values responsive to at least one selected from the group consisting of:

the number of occurrences of the item in a user log;

the logarithm of the number of occurrences of the item in a user log;

the number of occurrences of the item in all user logs;

the logarithm of the total number of users divided by the number of users who have selected the item; and

a normalizing factor.

90. (Original) The computer-readable medium of claim 89, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

91. (Original) The computer-readable medium of claim 59, further comprising:

computer-readable code adapted to delete from the determined at least one result item any result items already selected by a user associated with the query.

92. (Original) The computer-readable medium of claim 59, further comprising:

computer-readable code adapted to rank the at least one result item responsive to the degree of significance.

93. (Previously Presented) A computer-readable medium comprising computer-readable code for discovering a relationship between a first item and a second item, comprising:

computer-readable code adapted to determine, in a computer, a total number of item groups N;

computer-readable code adapted to determine, in the computer, a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item;

computer-readable code adapted to determine, in the computer, a number of item groups N_2 not in the subset of item groups;

computer-readable code adapted to determine, in the computer, a number of item groups k_{11} in the subset that contain the first item;

computer-readable code adapted to determine, in the computer, a number of item groups k_{12} not in the subset that contain the first item;

computer-readable code adapted to determine, in the computer, a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item;

computer-readable code adapted to determine, in the computer, a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item;

computer-readable code adapted to determine, in the computer, a log likelihood ratio; and

computer-readable code adapted to generate, based on the log likelihood ratio, a representation of the relationship between the first item and the second item.

94. (Original) The computer-readable medium of claim 93, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

95. (Original) The computer-readable medium of claim 93, wherein each item group comprises a document.

96. (Previously Presented) The computer-readable medium of claim 93, further comprising:

computer-readable code adapted to adjust, in the computer, at least one of the k_{ij} values responsive to at least one selected from the group consisting of:

the number of occurrences of the item in a document;

the logarithm of the number of occurrences of the item in a document;

the number of occurrences of the item in all documents;

the logarithm of the total number of documents divided by the number of documents that include the item; and

a normalizing factor.

97. (Original) The computer-readable medium of claim 96, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j represents the number of occurrences of the item in all documents and W_{ij} represents the number of occurrences of the item in a particular document.